(11) (A) No. 1005204

(45) ISSUED 770215

(52) CLASS 8-93.11
C.R. CL.

(19) (CA)

CANADIAN PATENT

(54) METHOD OF CONDITIONING FABRICS AND PRODUCT THEREFOR

(70) Gaiser, Conrad J.,
U.S.A.

Granted to The Procter & Gamble Company,
U.S.A.

(21) APPLICATION No. 049,669
(22) FILED 690424

(30) PRIORITY DATE

No. OF CLAIMS 33

A method and article for c nditioning fabrics in a laundry dryer are provided. The fabric c nditioning article comprises a substrate (which is preferably but not necessarily in the form of a flexible, tear-resistant web) carrying a fabric onditioning agent. The fabric conditioning article is placed in a dryer with damp fabrics and the fabric conditioning agent transfers to the fabrics during the drying operation.

This inv ntion is concerned with surface modificati on of fabrics to impart desired properties thereto, primarily softness or "hand", but also including antistatic, lubricating, bacteriostatic, mildew and moth-proof properties. It is common practice in laundering to treat various types of household and garment fabrics, such as wool, cotton, dacron or nylon, with one or more specialized conditioning agents selected for example to render them soft to the touch and/or to reduce knotting or wrinkling; to facilitate ironing the fabrics, or to render the clothes free of static, or bacteria-resistant, or to deodorize or in any other way to condition them.

Fabric conditioning is presently done by introducing a liquid comprising a solution or dispersion of the agent into the washing machine either during the washing cycle or the rinsing cycle and particularly in the last rinsing step. Because most fabric conditioning agents are cationic and hence chemically incompatible with the soaps and anionic detergents in the wash water occluded in the fabric conditioning effectiveness is greatly reduced. Thus, there is no assurance that an effective amount of the agent will remain on the fabric when adding the liquid conditioning agent at the start of the last rinsing step, as there may be residual detergent or soap present, especially in the home laundry.

The criticality of agent addition timing means that the housewife must attend her supposedly automatic machine until the proper moment, which is a major inconvenience. Moreover, application of the agent from a liquid dispersion or solution is uneconomical because the relatively low solubility of most conditioning agents necessitates solution and dispersion in 16 to 20 times as much solvent, usually water or water-alcohol mixtures, as agent; this increases packaging, shipping and handling costs.

SUMMARY OF THE INVENTION

The present invention is designed to overcome difficulties now encountered in conditioning fabrics, especially in the home. Summarizing the invention, it comprises carrying the conditioning agent as a removable coating on a substrate, which may be readily packaged, handled and shipped or transported and used, all in the dry state. In use, a sheet of the substrate carrying the agent may be placed in a conventional laundry dryer with washed, but still wet or damp fabric which may include sheets, garments, pillow cases, etc., rinsed of detergents or soaps. The fabric articles and conditioner are tumbled together and the coated conditioner is transferred to the fabric to place the conditioner on the same.

In one broad aspect this invention resides in a method of conditioning fabrics which comprises commingling pieces of damp fabric by tumbling said pieces with heat in a laundry dryer together with a substrate carrying a transferable conditioning agent thereby to effect transfer of the conditioning agent to the fabric while being dried.

More limited aspects of the method of this invention include the use of a flexible tear resistant web as the substrate, using the conditioning agent in an amount of about 1 to 10 grams per 105 square inches, using a fabric softening and antistatic agent as a conditioning agent, using a low melting normally solid material as conditioning agent, using a conditioning agent which is soluble or dispersible in water, and providing interconnected sheets as the substrate.

In a broad aspect the invention resides in a flexible substrate carrying a fabric conditioning agent, said fabric conditioning agent comprising a material which has a softening temperatur below th temperature of about 120°F. to 190°F. encountered in a laundry dryer to enhanc thereby transfer of

said fabric conditioning agent to fabrics contacted therewith, the weight ratio of fabric conditioning agent to flexible substrate being at least 0.25:1. The amount of fabric conditioning agent can also be expressed as at least 1 gram per 105 square inches of substrate.

More limited aspects include the article described above having an upper limit of 4.5:1 of fabric conditioning agent to flexible substrate or not more than 10 grams per 105 square inches, a tear resistant web as the flexible substrate, paper, cloth or a porous non-woven web as the flexible substrate, a fabric softening and antistatic agent as the conditioning agent, and providing interconnected sheets as the substrate.

Specifically the invention provides a fabric conditioning method, a fabric conditioning article and a package suitable for conveniently retailing and using premeasured fabric conditioner quantities. With respect to the method, the invention provides, in the conditioning of fabrics by addition of conditioning agents thereto, the step of commingling the fabric to be conditioned and a substrate on which the conditioning agent is removably coated in a manner to effect transfer of the agent to the fabric and coated substrate and repeated random contact between substrate and fabric is typically used for transfer such as is readily effected in an ordinary clothes dryer filled with clothing which is initially damp and which is tumbled under drying conditions of elevated temperature forced air circulation. The conditioning agent is preferably a low melting normally solid material and may be carried on a substrate less sorptive than the fabric whereby contacting of the coated substrate with the fabric at temperatures above the softening temperature of the conditioning agent ffectively transfers the agent to the fabric. A fabric conditioning article is provided

including a carrier comprising a suitable substrate and a coating thereon of fabric conditioning agent which is removable to a fabric contacting the carrier. The substrate may be of cellulose fiber such as ordinarily, a paper, and may be substantially non-adsorbent to better maintain the agent on the surface thereof. The conditioning agent or conditioner may be any fabric modifying material desirably placed on fabrics and is more usually a softening product such as an organic compound having both hydrophilic and hydrophobic character. Primary among these are the organic nitrogen containing compounds which are substantive to fabrics and which contain at least 12 carbon atoms, such as the fatty amines and their salts or quaternarized amines, particularly those having the Structure I or II depicted hereinafter in which at least one substituent group is hydrophobic i.e. contains 12 or more carbon atoms and in which the associated anion is a halide.

An important advantage of the present invention is the efficiency and ease of packaging, marketing and use of the just-mentioned articles. The conditioning agent may be applied to the substrate as a 100% solids coating, and rolled or interleaved for wrapping and sale. Moreover, the substrate may comprise separate and separable sheets e.g. separable along longitudinally spaced transverse lines of weakness formed by perforation or scoring. The sheets are readily made of a size to delimit pre-measured quantities of conditioning agent, related to area, whereby a portion only of the substrate and appropriate to the fabric quantity to be treated may be selected and combined with the fabric in the dryer.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic side elevational view of a conventional form of apparatus which may be employed for effecting application of a fluid conditioning agent to a continuous substrate;

Fig. 2 is a schematic elevational view of a well known type of household laundry dryer; a portion of the structure being shown broken away; and

Fig. 3 is an isometric view of a perforated roll of the coated substrate from which individual sheets can be readily detached by the housewife for use in the method thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Simply stated, the invention enables introduction of fabric softeners or other conditioners to fabrics at the most convenient and most effective time. Because the conditioners are used in the drying cycle rather than in the terminal part of the washing cycle, the housewife is free of need to watch her washing machine for the right moment. Because the conditioners, which may be detergent sensitive, are added only after substantially all detergent has been removed the deleterious effect of detergent on the conditioner is minimized.

The present articles are easily prepared by coating a conditioning agent onto a suitable substrate. Requirements of a good substrate are ability to retain the coated conditioner, resistance to shredding or other tearing failure when tumbled with damp clothes, absence of a tendency to ball up when wet or damp, and efficient transfer of coated conditioner. Suitable substrates will thus include materials having sufficient wet strength and surface area to carry adequate quantities of conditioner into the dryer or other commingling device. Porous or nonporous, woven or nonwoven, calendered or extruded sheet materials are highly useful. The conditioner on the substrate surface is most readily transferred to fabric and therefore substrates relatively impermeable to the conditioner such as moisture resistant fibrous materials including wet strength papers, regenerated cellulose, rayon, nylon, polyester, polyacrylonitrile, polyolefin and other synthetic woven or unwoven fibrous materials

are preferred for economy in application of conditioner. Wet strength paper offers a good balance of performance and cost and is highly preferred. As used herein such paper is considered to be paper which has been impregnated with a water-proofing or sizing material such as a thermosetting resin e.g. a phenol- or amine-, especially melamine-formaldehyde resin or casein, starch or other impregnant, having the effect of reducing water absorption by fibrous cellulosic products. Additionally, waxy papers which carry coatings or impregnations or paraffin or a microcrystalline or synthetic wax may be used, e.g. "butcher paper" or dry waxed paper, to the extent of reducing moisture absorption but permitting adherent coating of the paper with conditioning agent.

In physical terms, the wet strength papers retain at least 15% of its dry strength and preferably 20 to 60% thereof when water saturated. The presence of sizing resins tends to stiffen the paper and inhibit balling up in a dryer, which thus affords additional surface area for transfer contact of the conditioning agent to the fabric. Kraft papers (20-40 lbs. per ream - 3000 sq. ft.) having a caliper of 15 to 65 mils and containing 3.5 to 8 pounds of thermosetting resin per ream have provided excellent results, particularly those remaining at least moderately flat in the dryer.

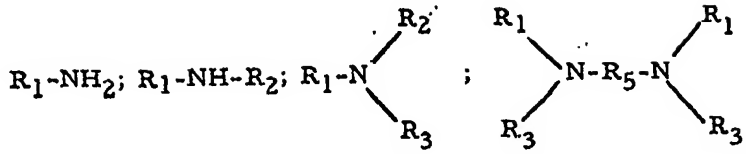
Onto the just described substrate material there is placed a coating of the conditioning agent. The agent may be impregnated in the carrier sheet to provide a relatively thin coating but best results in terms of conditioning agent and cost are realized when the substrate carries the agent substantially as a discrete surface coating. This coating may be of irregular thickness on the substrate, e.g. or 0.1 to 10.0 mils. A desirable amount of the coating is about 4 grams per ft.^{2} on the surface of the substrate, one side, or half the amount per side if both sides are coated.

It will be apparent that many materials might be added to fabrics following fabric washing e.g. a silicone to give ease of ironing, a bacteriocide-fungicide to combat mildew fungus and odor, or an antistat to prevent "cling" particularly in nylon fabrics. The most universal preference however, is for an improvement in the feel or hand of the fabric, i.e., downy softness instead of harshness resulting from hard water or detergent use. The present method and article are highly advantageous as a means of imparting softening conditioning to fabrics. Obviously the relationship of the various conditioning agents and the substrate is a physical one and for that reason any conditioning agent able to be adhered to the substrate, and transferred to the fabric may be used for its specific effect. The following illustrative materials are therefore not limitative of the scope of the invention.

Typically fabric softeners are cationic materials having substantivity to fabrics. Anionic and amphoteric materials are also useful however, depending on the fabric. In general, useful softeners are organic compounds which (1) contain primary, secondary, tertiary or quaternary nitrogen, or which are phosphonium or sulfonium compounds and (2) have a relatively long hydrocarbon group substituent conferring hydrophobicity and lubricity. Among such groups are alkyl groups containing 12 or more carbon atoms and desirably at least 16 to 18 up to 22 carbon atoms to effect efficacious softening. Other substituent groups on the nitrogen may be hydrocarbon, usually of fewer than 8 carbon atoms, on relative polar groups such as carboxyl, hydroxyl, alkoxy and ester groups of fewer than 8 carbon atoms. Typical fabric conditioners include:

(A) Primary, secondary, and tertiary amines or diamines and their water soluble or water dispersible salts.

For example:



where R_1 and/or R_2 may each be an alkyl group of 12 to 22 carbon atoms; R_3 and R_4 are lower alkyl, e.g. methyl or ethyl groups; and where R_5 is an alkylene chain of 4 or 6 carbon atoms wherein the two middle carbon atoms are linked to each other by an ether oxygen or by a double or triple bond. The following is a list of compounds of such type:

1. Partially substituted primary, secondary, or tertiary amines with various fatty constituents such as lauryl, palmityl, stearyl, coco, tallow or oleyl.

Examples: hydrogenated tallow amine (RNH_2)

dicoco amine (R_2NH)

coco dimethyl amine ($RN(CH_3)_2$

Trademarks: "Armeen"[1]. series (Armour Industrial Chemical Co.)

"Alamine"[2]. series (General Mills, Inc.)

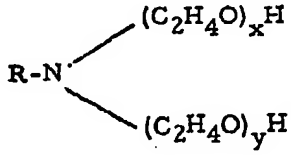
"Formonyte 600"[3]. series (Foremost Chemical Products Company)

2. Diamines with various fatty constituents including coco, tallow, and oleyl. Common among the available diamines are: N-alkyltrimethylene diamines ($R\text{-}NH\text{-}C_3H_6\text{-}NH_2$).

Trademarks: "Duomeen"[4]. series (Armour Industrial Chemical Co.)

"Formonyte 800"[3]. series (Foremost Chemical Products Company).

3. Ethoxylated amines and diamines with fatty alkyl groups of coco, tallow, soya, and stearyl, typically with 2, 5, 15 or 50 moles ethylene oxide:



1. "Armeen" - Trademark for a series of high-molecular-weight aliphatic amines: primary, secondary and tertiary. Available in chain lengths ranging from C_8 to C_{18} and up to 92% purity of a single homolog, also in natural mixtures of these chains derived from coco, soya or tallow fatty acids.

2. "Alamine" - Trademark for a series of primary, secondary, and tertiary aliphatic amines, organic substituted ammonia derivatives. Soluble in variety or organic solvents. Not appreciably soluble in water. Ranging in chain length from C_{12}-C_{18} and having varying degrees of unsaturation.

3. "Formonyte" - Trademark of Foremost Chemical Products Company. N-alkyl trimethylene diamines with alkyl groups derived from various fatty sources. The "600" and "800" designations are indicative of the approximate molecular weights of the respective products.

4. "Duomeen" - Trademark for a series of N-alkyl trimethylene diamines, the general structure for which is R-NH-$(CH_2)_3$-NH_2, in which the R represents an alkyl group derived from coconut, soya or tallow fatty acids. They have a minimum amine content of 80%, calculated as diamine. They are insoluble in water but soluble in organic solvents.

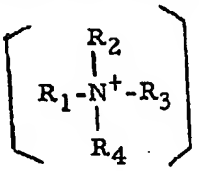
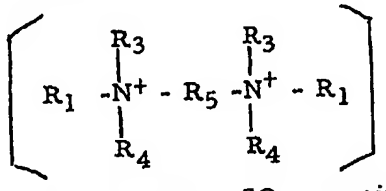
Trad marks: "Sipenol"[5]. (Alcolac Chemical Corporation)

"Ethomeen"[6]. series (Armour Industrial Chemical Co.)

"Ethoduomeen"[7]. series (Armour Industrial Chemical Co.).

(B) A quaternary or bis-quaternary ammonium base or salt.

For example the following Structures I and II referred to previously:

(I)  X^-; or (II) X^-  X^-

where X may be any of the following: OH, Cl, Br, CH_3OSO_3, SO_4, or similar anion, and R_1, R_2, R_3, R_4, and R_5 the same as above. Salts of this type include:

Distearyl dimethyl ammonium chloride

N-alkyl trimethyl ammonium chloride

Dialkyl dimethyl ammonium chloride

Methyl difatty alkoxy ammonium sulfate

2,2'-bis(stearyldimethyl ammonio) diethylether dichloride.

Alkyl groups include lauryl, cetyl, stearyl, coco, soya, and tallow.

Trademarks: "Arquad"[8]. series (Armour Industrial Chemical Co.)

"Adogen"[9]. series (Ashland Oil and Refining Company)

"Culversan"[10]. series (Culver Chemical Company)

"Varisoft 222"[11]. (Varney Chemical Company).

(C) Alkyl imidazolines and imidazoles, including: 1-beta hydroxyethyl-2-alkyl imidazoline where the alkyl group is lauryl, oleyl, stearyl or tall oil.

(D) Alkyl pyridine and piperidine salts, including:

Alkyl pyridinium chloride

Stearamidomethyl pyridinium chloride

Stearoxymethyl pyridinium chloride

5. "Sipenol" - Trademark of the Alcolac Ch mical Corporation. Trademark for ethoxylated fatty and short-chain amines. They include ethoxylated coco, tallow, soya, and stearyl amines, as well as dimethyl, diethyl, and dibutyl ethanolamines.

6. "Ethomeen" - Trademark for a series of polyethoxylated aliphatic amines with alkyl groups rainging from C_8 to C_{18}, also for naturally occurring mixtures of these alkyl groups. Can be obtained with varying amounts of ethylene oxide content and therefore varying degrees of cationic strength from quite strong to almost nonionic.

7. "Ethoduomeen" - Trademark for a series of polyethoxylated high-molecular-weight aliphatic diamines. They are similar in some respects to the "Ethomeens", but have increased cationic properties, and increased water solubility relative to that of the ETHOMEEN having the same ethylene oxide content.

8. "Arquad" - Trademark for a series of cationic quaternary ammonium salts containing one or two alkyl groups ranging from C_8 to C_{18}. They are water-soluble and are generally compatible with non-ionic and cationic wetting agents.

9. "Adogen" - Trademark of Ashland Oil and Refining Company for a line of fatty nitrogen chemicals including amines, amides, amine acetates and quaternary ammonium compounds.

10. "Culversan" - Trademark of the Culver Chemical Company. High molecular weight quaternaries including alkyl dimethyl benzyl, ammonium chloride, alkyl isoquinolinium bromide, dodecylbenzyl trimethyl ammonium chloride, alkyl dimethyl 3,4-dichlorobenzyl ammonium chloride, alkyl dimethyl benzyl ammonium chloride and alkyl dimethyl 3,4-dichloro-benzyl ammonium chloride, stearyl dimethyl benzyl ammonium chloride.

11. "Varisoft 222" - Trademark of the Varney Chemical Company. High molecular weight quaternari s including compl x difatty quaternary compounds.

(E) Alkyl sulfonium salts.

(F) Alkyl phosphonium salts.

(G) Esters of amino acids.

(H) Esters of amino alcohols.

(I) Alkyl guanidine and their salts.

Effective as antistatic agents are usually the quaternary ammonium salts, e.g. chlorides, bromides, or sulfates, and the alkyl imidazolinium chlorides, bromides, or sulfates, e.g. alkyl dibenzyl ammonium chlorides and alkyl amines in which at least one alkyl group contains from 12 to 22 carbon atoms. Quaternary nitrogen compounds such as alkyl dimethyl benzyl-ammonium and dodecyl trimethyl ammonium halides are also desirable bacteriostatic agents.

The amount of conditioning agent incorporated onto the substrate is that which is effective, without substantial excess which would serve no purpose. The actual amount in any given case is variable and will depend on the end use, the agent and the substrate employed. For example, about 1.0 to 10.0 grams of a softening agent on a sheet of approximately 105 square inches of paper, introduced will usually suffice for the normal household dryer in which the usual load of 5 to 10 lbs. of fabric is dried in about 40 to 60 minutes under normal drying conditions of about 120°F. to 190°F. In commercial laundries having greater dryer capacity, more agent carrying substrate sheets are added with the fabric pieces to the dryer.

Many of the aforementioned agents are normally solid and low melting as well as soluble or dispersible in water or in water-alcohol (desirably isopropyl alcohol for economy). To coat them onto a substrate, the substrate is dipped into a solution or disp rsion of the agent having a concentration sufficient to provide the desired amount of agent on the sub-

strate, or the substrat is coated with a hot melt or solution in a suitable liquid of the agent by any coating technique including a roll applicator which meters the coating onto the substrate, followed by chilling or if a solvent is used by the removal of the solvent from the substrate by drying either at ambient temperature or in an oven.

The resultant treated substrate can then be distributed in perforated roll form from which individual sheets can be readily detached, with each sheet carrying a desired predetermined amount of agent, or it can be packaged in the form of a stack of individual separated sheets each carrying such amount of agent.

The apparatus of Fig. 1 comprises a coating pan 6 containing a molten agent coating composition 7, and in which is rotatably mounted a conventional applicator coating roll 8 of metal, such as steel. A conventional doctor blade 9 is in slight frictional contact with the coating roll to smooth out the liquid which is applied to the underside of substrate 11 as it moves continuously with a smooth, uninterrupted motion in the general direction indicated by the arrows as the substrate is unwound from a supply roll (not shown). A conventional continuously rotatable back-up roll 12 having a resilient covering 13, desirably rubber, provides a nip with roll 8 between which continuously moving substrate 11 passes; the substrate being trained over conventional idler rolls 14 on either side of the nip.

After the underside of the substrate is coated, it is continuously conveyed to a rotatable chill roll 16 between additional idler rolls 14, and which may be water cooled whereby the melt is solidified to leave the conditioning agent as a solid coating on the surface of the substrate.

Upon leaving the chill roll the coated substrate is re-

wound into a roll 17. A coating of the conditioning agent may be applied to each side of the substrate or only one side by evident variations in the coating line.

The coated substrate 11 may be formed into roll 18 by conventional means, of the size usually employed in household rolls e.g. of paper toweling. As shown in Fig. 3, the roll 18 is formed of wound substrate 11 with spaced lines of weakness 19, in the form of perforations, detachably connecting sections 21 which provide sheets having a coating 22 of the agent, each sheet being of a size carrying the same predetermined amount of agent suitable for use in treating a usual load of clothes in a conventional household dryer.

Thus, the perforated roll provides a package whereby the conditioning agent is usable in predetermined increments merely by detaching the respective sheets 21 along their lines of weakness 19. Although a dispensing roll is preferred, predetermined sizes of the substrate carrying each the same premeasured amount of conditioning agent may be dispensed from conventional dispensing packages as individual sheets.

As is illustrated in Fig. 2 of the drawings, sheet 21 coated with a fabric conditioning agent is introduced into a conventional fabric dryer chamber or enclosure 27 having a conventional rotatable drum or agitator 27 and a door 29. Drum ribs 31 effect a thorough commingling of the pieces of washed but damp fabric 32 with the substrate with repeated random collisions. Vent 33 is provided, allowing escape of drying air and water vapor.

The normal drying time of about 40 to 60 minutes and the normal drying temperatures of about 120°F. to 190°F., commonly employed for laundry drying are satisfactory. High humidity conditions exist in the dryer, and by the time the fabric pieces hav been dried, conditioning agent has been

transferred from th substrate to the fabric and is randomly deposited thereon. Once deposited the softener may spread along the fabric surface. Aft r the conditioning treatm nt, the dried pieces of fabric are removed from the dryer and handled in the customary manner, such as ironing.

EXAMPLE I

A conventional paper towel of about 105 square inches in size was immersed in a dispersion of 2.0 grams of dimethyl, di(hydrogenated tallow) ammonium chloride (a quaternary ammonium compound known as "Arquad 2HT-75" by Armour Chemical Company) in 7.0 c.c. of water and 1.5 c.c. of isopropanol, prepared at 18°C. After all the liquid had been absorbed and the paper towel was dried at ambient temperature, 2.0 grams of the agent was inpregnated uniformly in the body of the substrate leaving a surface coating, and the substrate was dried. The impregnated substrate carrying the agent was then introduced into a conventional household clothes dryer ("Kenmore"[12] gas dryer) with an approximate 8 lb. load of damp fabrics (towels and linens) which had been spin-dried by centrifugation in the washer. During a conventional drying cycle of about 50 minutes under conventional drying temperature of about 150°F., the substrate was thoroughly tumbled around with the fabric by the drying agitator.

During such treatment, the agent was removed from the surface of the substrate through abrasion and moisture transfer to fabric pieces rendering them noticeably softer, antistatic and fluffier. The thus imparted lubricating effect and resultant freedom from static reduced knotting and cloth binding, thereby substantially reducing wrinkling. The antistatic qualities remained with the fabric pieces until they were rewashed, thus rendering them more comfor-

12. Trademark.

B

table to wear; and because of the softening, the need for ironing was minimized and ironing was made easier.

EXAMPLE II

Fifty grams of the aforementioned quaternary ammonium compound of Example I, was dispersed in 15 c.c. of isopropyl alcohol and 70 c.c. of water at 75°C. Ten conventional sheets of perforated paper toweling, each of 120 square inches, were folded along the perforations into a pad which was pressed into this dispersion, and was squeezed and worked until all the solution was evenly dispersed throughout the pad.

The pad was then unfolded and hung on a wash line to dry. Drying took about 10 hours at ambient temperature. After the drying, the impregnated sheets having a surface coating were very flexible, translucent and had a waxy feel. Checking the dry weight of the towels established that each sheet had picked up approximately 5 grams of the conditioning agent.

Over a period of several weeks, these towels were employed for conditioning fabrics by adding one towel to a conventional gas heated ("Kenmore") clothes dryer with each load of approximately 8 lbs. of freshly laundered clothes to be dried; the drying temperature being about 150°F., and the time about 50 minutes. After the drying, the clothes were removed and in each instance were softer, had fewer wrinkles, showed no electrostatic charge and ironed more easily. Each removed paper towel was intact, and had lost about 80 weight percent of the agent.

EXAMPLE III

A conventional resin sized (about 6 lbs. per ream) high wet strength Kraft paper, weighing 30 lbs. per ream (3,000 sq. ft.) and having a caliper of about 0.0043 inch,

was coated with uniform distribution on one side with a melt of the conditioning agent of Exampl I in an amount of about 2.15 grams per sq. ft.

A 10 x 10 inch square of the thus coated paper was introduced into a conventional household dryer as in Example I with an approximate 8 lb. load of fabrics, nad the fabrics were dried as in Example I. The fabrics dried in the presence of the coated substrate, as in this example, were considerably softer than closely similar fabrics which were treated with presently commercial liquid conditioning agents added to the fabrics in the last rinse of the washing cycle.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Th method of conditioning fabrics which comprises commingling pieces of damp fabric by tumbling said pieces under heat in a laundry dryer together with a substrate carrying a transferable conditioning agent, thereby to effect transfer of the conditioning agent to the fabric while being dried.

2. The method of conditioning fabrics which comprises commingling pieces of damp fabric by tumbling said pieces under heat in a laundry dryer together with a substrate carrying a transferable coating of a conditioning agent, thereby to effect transfer of the conditioning agent to the fabric while being dried.

3. The method of conditioning fabrics which comprises commingling pieces of damp fabric by tumbling said pieces under heat in a laundry dryer together with a substrate impregnated with a transferable conditioning agent, thereby to effect transfer of the conditioning agent to the fabric while being dried.

4. A method as claimed in claim 1 in which the substrate is a flexible substrate.

5. The method of claim 4 wherein said flexible substrate is a tear resistant web.

6. The method of claim 5 wherein the flexible web substrate is cloth.

7. The method of claim 5 wherein the flexible web substrate is paper.

8. The method of claims 5, 6 or 7 wherein the flexible web substrate carries an amount of conditioning agent of about 1.0 to 10.0 grams per 105 square inches.

9. The method of claims 1, 2 or 3 wherein the fabric pieces are rinsed substantially free of detergents or soaps and rendered damp by centrifugal spinning thereof prior to being

dried in said laundry dryer.

10. The method of claims 1, 2 or 3 wherein the conditioning agent is a fabric softening and antistatic agent.

11. The method of claims 1, 2 or 3 wherein the conditioning agent is a fabric softening agent.

12. The method of claims 1, 2 or 3 wherein the conditioning agent is an antistatic agent.

13. The method of claims 1, 2 or 3 wherein the conditioning agent is a bacteriostatic agent.

14. The method of claims 1, 2 or 3 wherein the conditioning agent is a low melting normally solid material and said contact of said agent with the fabric is at a temperature above the softening temperature of the agent.

15. A method as in claim 4 in which the flexible substrate is a tear-resistant web and the conditioning agent is in solid form.

16. The method of conditioning fabric which comprises commingling pieces of damp fabric by tumbling said pieces in a laundry dryer together with a flexible tear-resistant web substrate carrying a conditioning agent, said conditioning agent being a low melting normally solid material, and the substrate being contacted with the fabric at a temperature above the softening temperature of the conditioning agent, thereby to effect transfer of the conditioning agent to the fabric.

17. A method as in claims 1, 5 or 16 in which the substrate comprises a series of interconnected sheets, separable along predetermined lines of weakness, to provide a premeasured quantity of conditioning agent in each sheet.

18. A method as in claims 1, 5 or 16 in which the conditioning agent is soluble or dispersible in moisture so as readily to be transferable to the fabric und r high temperature and humidity conditions existing in a dryer.

19. A fabric conditioning article comprising a flexible substrate carrying a normally solid fabric conditioning agent, said fabric conditioning agent comprising a material which has a softening temperature below the temperature of from about 120°F. to about 190°F. encountered in a laundry dryer to enhance thereby transfer of said fabric conditioning agent to fabrics contacted therewith, the weight ratio of fabric conditioning agent to flexible substrate being at least 0.25:1.

20. An article as in claim 19 in which the weight ratio of fabric conditioning agent to the flexible substrate ranges from about 0.25:1 to about 4.5:1.

21. A fabric conditioning article comprising a flexible tear-resistant web substrate carrying a normally solid fabric conditioning agent, said fabric conditioning agent comprising a material which has a softening temperature below the temperature of from about 120°F. to about 190°F. encountered in a laundry dryer to enhance thereby transfer of said fabric conditioning agent to fabrics contacted therewith, the amount of said fabric conditioning agent comprising at least 1 gram per 105 square inches of said flexible tear-resistant web substrate.

22. An article as in claim 21 in which the amount of said fabric conditioning agent comprises about 1 gram to 10 grams per 105 square inches of said flexible web substrate.

23. An article as in claims 19 or 21 in which the flexible substrate comprises a series of interconnected sheets separable along predetermined lines of weakness to provide a premeasured quantity of fabric conditioning agent in each sheet.

24. An article as in claim 19 in which the flexible substrate is a tear-resistant web and said web is impregnated with th fabric conditioning agent.

25. An articl as in claims 20, 21 or 22 in which the flexible substrate is impregnated with the fabric conditioning agent.

26. An article as in claim 19 in which the flexible substrate is a tear-resistant web and said web is coated with the fabric conditioning agent.

27. An article as in claims 24 or 26 in which the flexible web substrate is paper.

28. An article as in claims 24 or 26 in which the flexible web substrate is cloth.

29. An article as in claim 24 in which the flexible web substrate is a porous non-woven web.

30. An article as in claims 19, 21, or 24 in which the fabric conditioning agent is a fabric softening and anti-static agent.

31. An article as in claims 19, 21 or 24 in which the fabric conditioning agent is a fabric softening agent.

32. An article as in claims 19, 21 or 24 in which the fabric conditioning agent is an antistatic agent.

33. An article as in claims 19, 24 or 29 in which the fabric conditioning agent is a fabric softening agent selected from the group consisting of:

(a) a quaternary ammonium compound of the formula

$$\left[R^1 - \underset{\displaystyle R_4}{\overset{\displaystyle R_2}{N}} - R_3 \right]^+ X^-$$

wherein R_1 and R_2 are each alkyl groups of 12 to 22 carbon atoms, R_3 and R_4 are each lower alkyl and X is an anion;

(b) alkyl imadazolines;

(c) alkyl imadazoles;

(d) mixtures thereof.

FIG-1

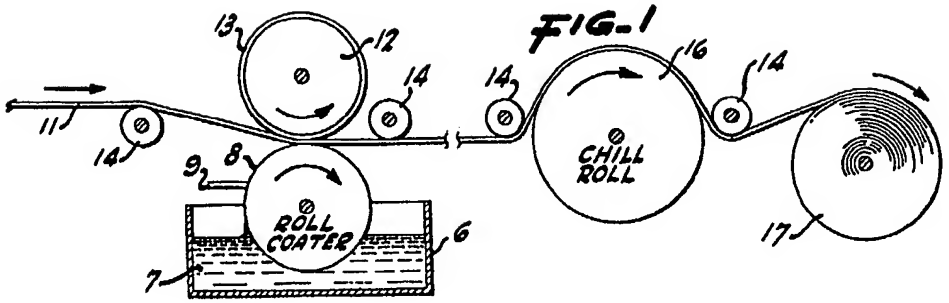


FIG-2

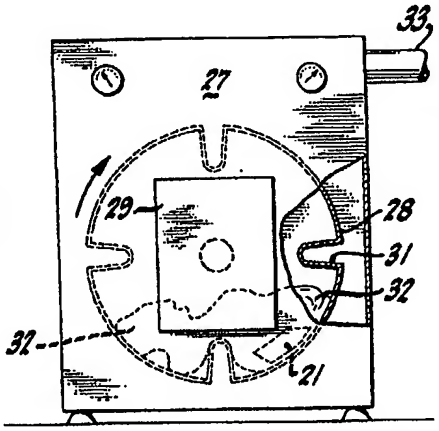
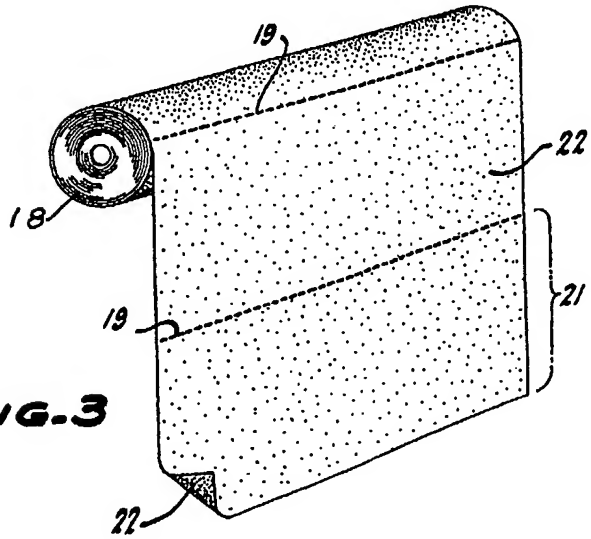


FIG-3



INVENTOR

Conrad Jerome Kaiser

PATENT AGENT

Alex. E. MacRae & Co.